

# OAK RIDGE NATIONAL LAB

## MAGNETIC AMPLIFIER FOR POWER FLOW CONTROL

PROJECT TITLE:	Magnetic Amplifier for Power Flow Control		
ORGANIZATION:	Oak Ridge National Laboratory (ORNL)	LOCATION:	Oak Ridge, TN
PROGRAM:	GENI	ARPA-E AWARD:	\$2,400,000
TECH TOPIC:	Electricity Transmission & Distribution	PROJECT TERM:	2/24/12 – 8/23/13
WEBSITE:	www.ornl.gov		

### CRITICAL NEED

The U.S. electric grid is outdated and inefficient. There is a critical need to modernize the way electricity is delivered from suppliers to consumers. Modernizing the grid's hardware and software could help reduce peak power demand, increase the use of renewable energy, save consumers money on their power bills, and reduce total energy consumption—among many other notable benefits.

### PROJECT INNOVATION + ADVANTAGES

ORNL is developing an electromagnet-based, amplifier-like device that will allow for complete control over the flow of power within the electric grid. To date, complete control of power flow within the grid has been prohibitively expensive. ORNL's controller could provide a reliable, cost-effective solution to this problem. The team is combining two types of pre-existing technologies to assist in flow control, culminating in a prototype iron-based magnetic amplifier. Ordinarily, such a device would require expensive superconductive wire, but the magnetic iron core of ORNL's device could serve as a low-cost alternative that is equally adept at regulating power flow.

### IMPACT

If successful, ORNL's magnetic amplifier could offer low-cost regulation of power flow within the electric grid. Complete control over power flow would reduce wasted energy, save consumers money, and balance the supply and demand for energy.

- **SECURITY:** A more efficient, reliable grid would be more resilient to potential disruptions from failure, natural disasters, or attack.
- **ENVIRONMENT:** Improving the efficiency of the grid by regulating power flow would result in less energy waste and eliminate the release of additional greenhouse gases. 40% of carbon dioxide emissions come from electricity generation.
- **ECONOMY:** A more efficient and reliable grid would help protect U.S. businesses from costly power outages and brownouts that stop automated equipment, bring down factories, and crash computers.
- **JOBS:** Advances in grid hardware could result in new high-paying jobs in supporting sectors such as engineering, manufacturing and service.

### CONTACTS

ARPA-E Program Director:  
Dr. Rajeev Ram,  
rajeev.ram@hq.doe.gov

Project Contact:  
Dr. Aleksandar Dimitrovski,  
dimitrovskia@ornl.gov

Partner Organizations:  
University of Tennessee,  
SPX Transformer Solutions (formerly  
Waukesha Electric Systems)

